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ORIGINAL RESEARCH

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Role of steroid injection for skin thickness and edema in rhinoplasty patients

Canset Aydın[1] | Ömer Taşkın Yücel[2] | Seray Akçalar[3] | Gamze Atay[2] | Serdar Özer[2] | Tevfik Sözen[2] | Deniz Akata[3]

[1]ENT Department, Medicana International Hospital, Ankara, Turkey

[2]ENT Department, Hacettepe University, Ankara, Turkey

[3]Radyology Department, Hacettepe University, Ankara, Turkey

Correspondence
Canset Aydın, ENT Department, Medicana International Hospital, Ankara, Turkey.
Email: cansetaydin@yahoo.com

Abstract

Objectives: The aim of this study was to observe the effect of the triamcinolone acetonide injections in thick skinned patients with ultrasonographic measurements and to compare these results with the postoperative nasal skin thickness of patients that were not injected with steroids.

Methods: A prospective study was planned with 42 thick nasal skinned rhinoplasty candidates in our clinic. Skin thickness of specific points along nose was measured and documented. On the 10th day after surgery, triamcinolone acetonide injections were performed into the supratip region of 21 patients in the study group. No injections were made for the control group. Nasal ultrasonographic measurements were repeated 40 days after the surgery for all 42 patients by the same radiologist and results were evaluated.

Results: Seventeen women (40.5%) and 25 men (59.5%) were included in the study. Patients' ages ranged from 18 to 53 with an average age of 27.9. In study group, all injections sites showed thinning on the 40th day after surgery. These findings were statistically significant at B (rhinion), D (middle of supratip), and G (middle of the tip). In the control group, all injection sites except A (nasion) displayed thickening on the 40th day after surgery. These findings were statistically significant at B (rhinion), D (middle of supratip), H (left side of the tip), and J (left alar region).

Conclusion: Triamcinolone acetonide injections are effective in the prevention of edema and provide thinning of the post-rhinoplasty skin envelope.

KEYWORDS
rhinoplasty, skin thickness, steroid injection

1 | ROLE OF STEROID INJECTION FOR SKIN THICKNESS AND EDEMA IN RHINOPLASTY PATIENTS

Rhinoplasty is a surgery performed to provide a functional nasal passage and better cosmesis. There are many factors affecting the aesthetic outcome of this surgery and skin thickness is one of the most critical ones among those factors. The thickness of the nasal skin varies along the length of the nose; the rhinion is the thinnest part and the skin gets thicker from the rhinion to the supratip.[1] Subcutaneous fatty tissue is thickest in the supratip area.[2] Nasal skin must contain the minimal level of sebaceous glands and subcutaneous tissues

but thickness must also be sufficient to camouflage the underlying skeleton.[1] It is problematic for the thick skin to adapt to the newly formed nasal skeleton after surgery, and dead space formation can be observed between the post-rhinoplasty skeleton and skin envelope. In the early postoperative period, this situation is recognized with a markedly edematous appearance compared to the patients with normal skin thickness. In the long term, especially after excess resection of nasal dorsum skeleton—meaning increased dead space formation—, granulation tissue fills the dead space and causes scar formation.[1,3,4] Scar formation may lead to a range of complications from obscure aesthetic outcome to a polly beak deformity.[1,3,5] There are many surgical or postsurgical methods to overcome supratip fullness. One alternative is triamcinolone acetonide injections to the supratip area. The primary aim of these injections is to reduce skin thickness and resolve postoperative edema. As a result, cosmetic alterations become apparent, scar formation in supratip area is reduced and revision surgery is avoided.[5,6] Triamcinolone acetonide is a preparation of triamcinolone with extended duration of effect in the area applied[7,8] and is effective up to 6 weeks at the injection site.[5] It has anti-inflammatory properties, reduces fibroblast proliferation, collagen, glycosaminoglycan synthesis and tissue fibrosis, increases collagen degradation by inhibiting collagenase inhibitors and causes fat atrophy.[5,9] Generally in practice, thick skinned patients can be recognized by inspection and palpation of the nasal skin envelope.[10] In this study, we have determined an objective criterion, the ultrasonographic measurements of the nasal skin thickness. Ultrasonography is a relatively cheap, new, easy, and noninvasive method of measuring nasal skin thickness.[11-13] Our objective was to observe the effect of the triamcinolone acetonide injections in thick skinned patients with ultrasonographic measurements and to compare these results with the postoperative nasal skin thickness of patients that were not injected with steroids.

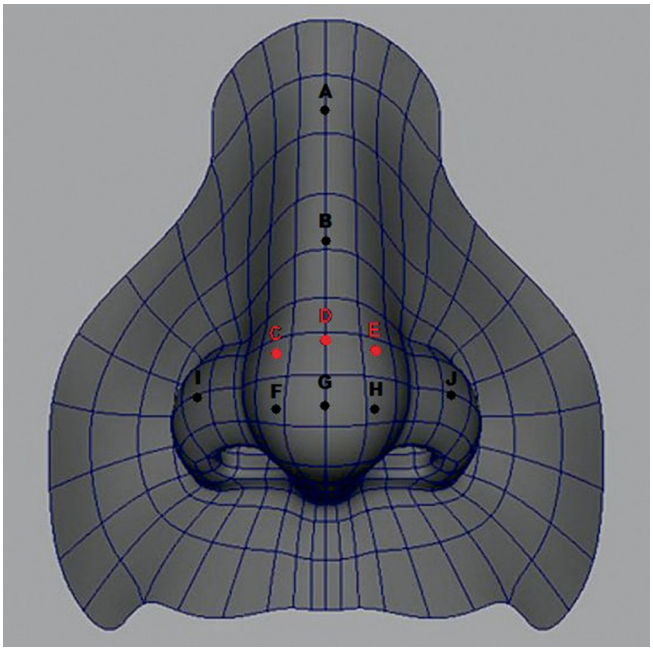

FIGURE 1 The schematic diagram on which ultrasonographic measurements were documented. Steroid injection sites are marked in red

2 | MATERIAL AND METHODS

A prospective study was planned with 42 thick nasal skinned rhinoplasty candidates in our clinic. Thick skin was diagnosed clinically by inspection and palpation and nasal ultrasonography was performed on all patients before surgery. Skin thickness, thickness of dermis, epidermis and hypodermis, of specific points along nose was measured and documented. Ten points on nasal dorsum were marked as demonstrated as specifically, A for nasion; B for rhinion; C for the right side of the supratip, D for the middle of the supratip; E for the left side of the supratip; F for the right side of the tip; G for middle of the tip; H for the left side of the tip; I for the middle side of the right alar region; J for middle side of the left alar region (Figure 1). Patients were randomly assigned to study and control groups in a fashion that every consecutive patient was distributed to each group. For instance,

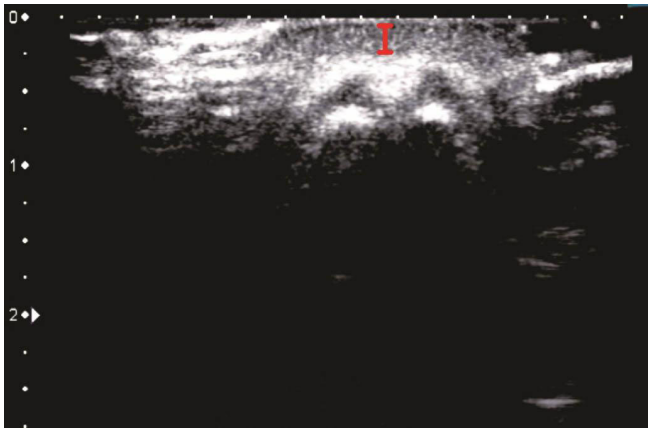

FIGURE 2 Skin thickness over the cartilage framework with red line

FIGURE 3 The ultrasound probe on nasal skin

patient number 1 was in study group whereas patient number 2 was control regardless of the operative procedure. On the 10th day after surgery, triamcinolone acetonide injections were performed into the supratip region of 21 patients in the study group. Injection sites are marked red in Figure 1.

Triamcinolone acetonide is commercially available only in the concentration of 40 mg/mL in our country (Kenacort-A) and was diluted to 10 mg/mL concentration with normal saline prior to use. 0.1 to 0.2 mL of triamcinolone acetonide was injected at the concentration of 10 mg/mL to the deep subcutaneous tissue of supratip area. No injections were made for the control group. Nasal ultrasonographic measurements of the skin thickness was repeated 40 days after the surgery for all 42 patients by the same radiologist who was blinded for the groups. Ultrasonographic measurements were performed in supine position with 4.8 to 9.2 mHz linear superficial probe. The ultrasonographic device was Toshiba's Aplio 500. During alar region measurements patient's head was turned to left and right to increase contact surface between the skin and probe. Perpendicular measurements to the skin were taken from the predefined points. Plenty of gel was used to not to compress the skin with probe and to get more detailed and exact images. An ultrasonographic image and a photo of the ultrasound probe on nasal skin are demonstrated in Figures 2 and 3. The study protocol was approved by the Hacettepe University Ethics Committee and was conducted in accordance with the principles of the Declaration of Helsinki. All participants provided written informed consent.

2.1 | Statistical analysis

Results were evaluated using the Student's *t*-test and Mann-Whitney *U* test. Statistical analyses were performed using SPSS software (version 15.0). *P* values <.05 were considered statistically significant.

3 | RESULTS

Seventeen women (40.5%) and 25 men (59.5%) were included in the study. Patients' ages ranged from 18 to 53 with an average age of 27.9. In all sites measured, the nasal skin of male patients was thicker than the skin of female patients before surgery according to ultrasonographic values and this difference was statistically significant ($P < .05$). In the study group, all injections sites showed thinning on the 40th day after surgery (Figure 4).

These findings were statistically significant at B (rhinion), D (middle of supratip), and G (middle of the tip). In the control group, all injection sites except A (nasion) displayed thickening on the 40th day after surgery (Figure 5).

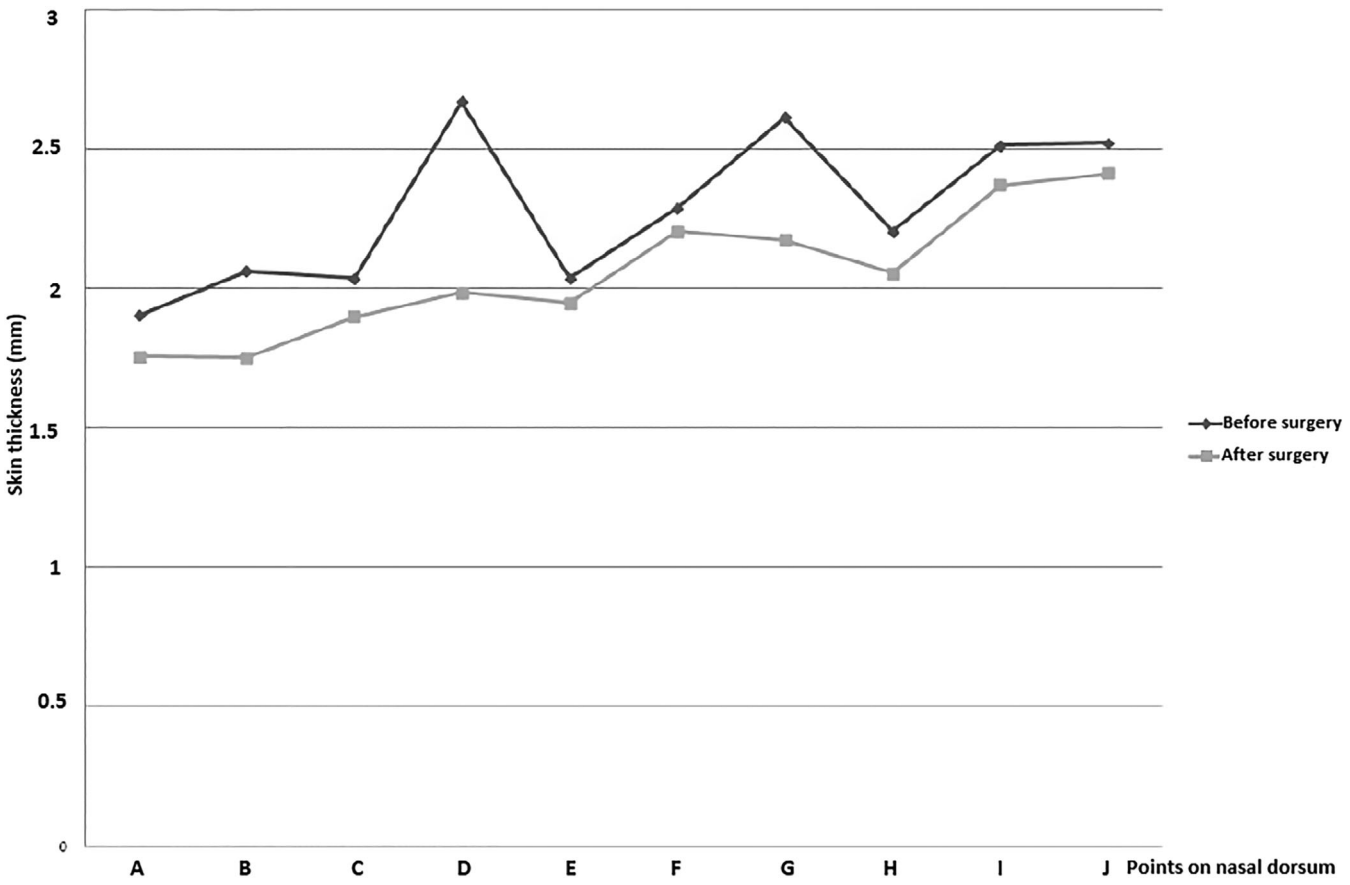

FIGURE 4 Skin thickness distribution before and after surgery in the study group

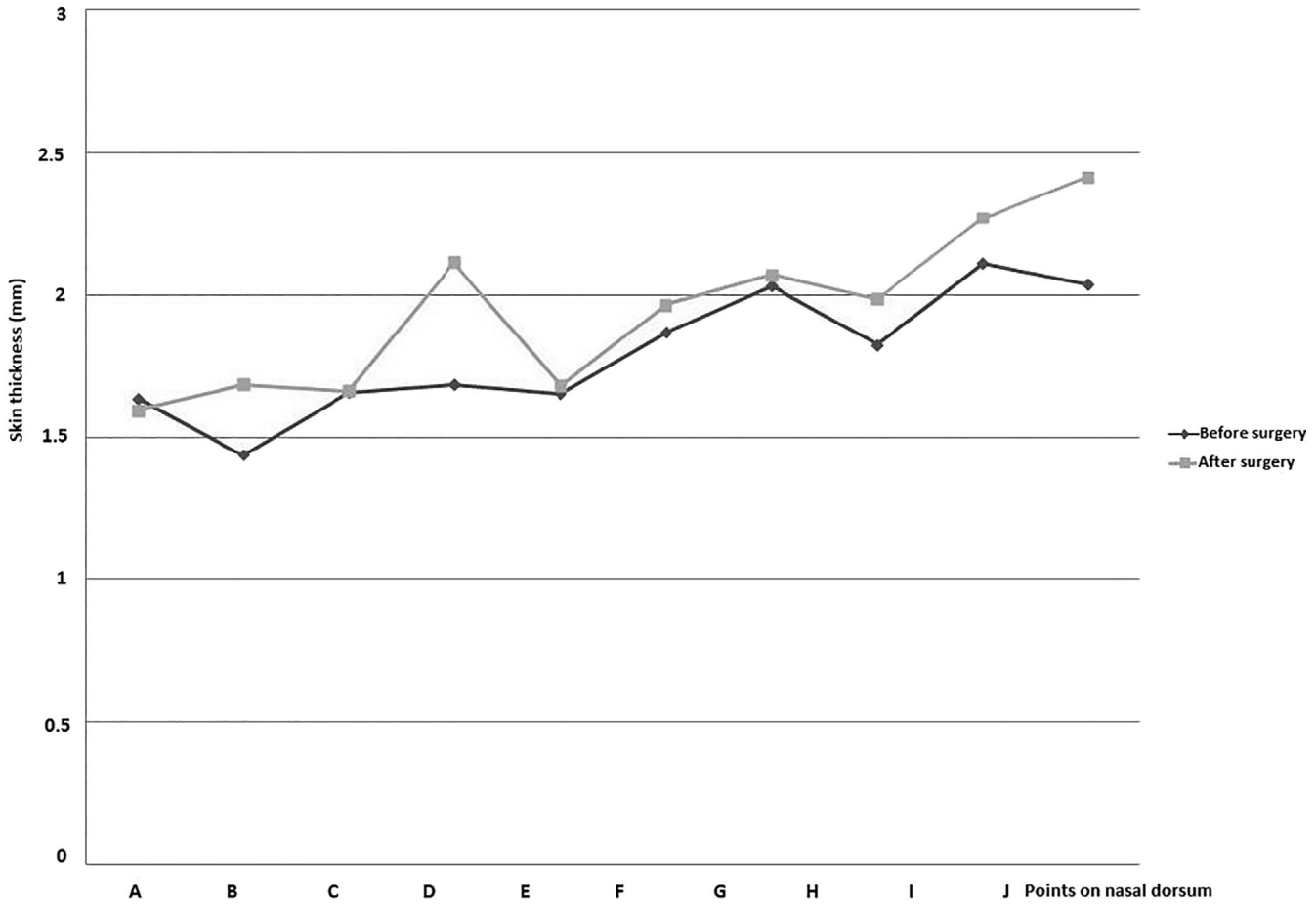

FIGURE 5 Skin thickness distribution before and after surgery in the control group

These findings were statistically significant at B (rhinion), D (middle of supratip), H (left side of the tip), and J (left alar region). The gender distribution of patient in the study and control groups were as follows: 4 of 17 women and 17 of 25 men were included in the study group after surgery. In female patients, four patients that were included in the study group displayed thinning at all sites except A (nasion). For 13 patients that were in the control group, all sites except C (right side of supratip) displayed thickening at the 40th day. The results of two groups were compared and it was found that skin thinning in the study group was statistically significant at B-(rhinion), D (middle of supratip), and H (left side of the tip). In male patients, 17 patients that were included in the study group displayed thinning at all sites. For eight patients that were in the control group, all sites except A (nasion) and G (middle of the tip) displayed thickening at the 40th day. The results of two groups were compared and it was found that skin thinning in the study group was statistically significant at B (rhinion), D (middle of supratip).

4 | DISCUSSION

Thick skin in rhinoplasty is a challenge. Many methods have been used for thick skin and the potential dead space between skin envelope and the new cartilage framework, during and after surgery. Jung et al[14] and Lemperle and Biewener[15] made a direct elliptical excision of the skin in the supratip region during open rhinoplasty. Kim et al[16] resected excessive soft tissue, bone, cartilage and used a supratip advancement suture in open procedure. Regalado-Briz[4] built a strong cartilage framework with sutures and sutured the supratip dermis to the underlying framework if needed. Conrad et al[17] injected fibrin glue between skin and the new framework to prevent formation of dead space. Hafezi and friends[2] elevated the skin in a new plane in open approach and left fat and sebaceous glands over nasal skeleton and thinned this layer. Rees,[3] Guyuron et al,[6] Gruber,[16] and Hanasono et al[5] performed triamcinolone acetonide injections into the supratip area after surgery. Rees[3] injected 2 to 5 mg triamcinolone acetonide at intervals of 1 to 2 weeks as needed. Guyuron[6] firstly taped supratip area in early stage (1-3 months postoperatively), if there was no acceptable reduction in supratip fullness within 4 weeks than injected 0.1 to 0.2 cc of 40 mg/cc or 0.2 to 0.4 cc of 20 mg/cc triamcinolone acetonide to supratip area, in case of insufficient response added additional injections at intervals of 4 weeks (maximum three injections) with small increases in dose. Gruber[18] injected 0.1 to 0.2 cc of 10 mg/cc triamcinolone with equal volume of xylocaine at 4 to 6 weeks after surgery, into the supratip or any other area at intervals of 1 or 2 weeks as needed. Kridel[5] injected 0.1 to 0.2 cc of 10 mg/cc

triamcinolone acetonide at 2 weeks after surgery, and injected every 4 weeks 0.1 to 0.2 cc of 10 or 40 mg/mL suspension based on the response of previous injection (maximum four to six injections). Pastorek[5] injected 0.1 mL of 10 mg/mL at 1 week after surgery, made another injection 0.1 cc of 25 mg/cc at 1 month after surgery if fullness was still present. We also prefer triamcinolone acetonide injections in thick skinned patients for prophylaxis and treatment of potential complications arising from skin thickness. Triamcinolone acetonide is easily applicable for both the patient and the surgeon, cheap, and may be used after either open or closed approaches. The effect is apparent within 4 or 6 weeks. There is minimal possibility of adverse effects with a correct injection technique. Steroids should not be injected into the superficial layers of the skin; instead, the correct injection should be into the deep subcutaneous tissue.[5,6,18] If no or insufficient effect is observed after a single injection, the treatment may be repeated with increasing dosage. In our opinion, the need for revision surgery may be considerably reduced after efficient use of this technique. The injections were performed at the 10th day after surgery to take advantage of steroid effects on prevention and lysis of scar tissue.[5] In previous studies with triamcinolone acetonide, its effect was evaluated by the surgeon's peers subjectively. This study was designed to evaluate skin thickness and the effect of steroid injections with an objective method, namely nasal ultrasonographic measurements. Nasal skin at all points were thicker in men than women as expected. The thinnest area was nasion in women on contrary to man in whom rhinion was the site with thinnest skin. Rhinion was found out to be the thinnest area in overall group as far as the number of male participants was exceeding number of women. From this point to upward and downward the skin became thicker. The thickest areas were respectively middle of tip, right and left alar regions and middle of supratip. Among steroid injected women, thinning in skin was statistically significant at rhinion, the middle of supratip and the left side of the tip; among steroid injected men, thinning in skin was statistically significant at rhinion and the middle of supratip. The study group included 4 of 17 rhinoplasties performed on women, therefore statistical analyses were less reliable for female patients. Thinning at middle of supratip area was consistent with the aim of this study. Supratip is the thickest area of the nasal skin envelope and this fact is directly related with increased postoperative dead space formation at this site. Besides injection sites, thinning of the surrounding skin was observed and it was thought to occur via subcutaneous spread of the injected steroid and reduction of edema with time. This phenomenon may be beneficial for homogeneity of the skin thinning effect. Among women in the study group there was thinning in both the right and left sides of the tip but this was statistically significant only in the left side. This finding also was not clinically significant because no visible asymmetry was present in these patients. These relatively inconsistent findings may be due to: difficulty to use the ultrasonography probe at sites other than the dorsum, compression of nasal structures with the probe because of the flexibility of alar regions or preoperative asymmetry of the nose. In all 21 patients in the control group, all points except nasion thickened after surgery. This thickening was statistically significant at rhinion, the middle of supratip, left side of the tip, and the left alar region. In the study group, all sites thinned and this thinning was statistically significant at rhinion, the middle of supratip and the tip. It can be deduced from study findings that thick skin before surgery displayed additional thickening with the effect of postoperative edema. And this phenomenon was statistically significant at the supratip region which is more prone to dead space formation, leading to the polly beak deformity. The findings in the study group prove that steroids effectively counteract the effect of postoperative edema, as significant thinning was observed at the sites described above. Statistically significant thinning at the middle of supratip and tip is especially important for the visibility of aesthetic alterations. Moreover, it was noticed that, nasal contour was improved in the study group compared to the control group at the end of 40 days. One limitation of this study was the relatively short follow-up period. Cosmetic results of steroid injections after rhinoplasty may be assessed more reliably if the follow-up is extended over 40 days. Yet, even with this significant limitation, we can conclude that triamcinolone acetonide injections are effective in the prevention of edema and provide thinning of the post-rhinoplasty skin envelope in the short term.

CONFLICT OF INTEREST

The authors declare no potential conflict of interests.

ORCID

Canset Aydın https://orcid.org/0000-0001-6288-636X

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